

GENERAL SPECIFICATIONS

FOR

SPEEDREADER 400 PUNCHED CARD READER

August 3, 1964

Uptime Corporation  
15910 West Fifth Avenue  
Golden, Colorado

Telephone      279-3351

GENERAL SPECIFICATIONS  
FOR  
SPEEDREADER 400

**0.0 PREFACE**

The Speedreader 400 is a photo-electric punched card reader reading punched cards in a column-by-column fashion at a rated speed of 400 cards per minute.

**1.0 GENERAL DESCRIPTION**

**1.1 Equipment**

The Speedreader 400 punched card reader consists of the following components:

**A. Transport**

1. Card Input Hopper
2. Picker Mechanism
3. Transport Channel
4. Card Output Hopper
5. Drive Motor and Power Train
6. Photo-Electric Reading and Timing Head complete with Photodiodes
7. Input Hopper Card Weight

**B. Structural Frame**

This is a rigid welded assembly, fabricated from  $1\frac{1}{4}$ " X  $1\frac{1}{4}$ " X  $1/8$ " angle iron. All surfaces are sandblasted, primed and painted.

**C. Cabinetry**

Desk-top unit. Electronics packaged in desk or other enclosure per customer's specifications.

**D. Electronic Hardware**

1. Picking Circuitry
2. Control Circuitry
3. Photodiode Reading Circuitry
4. Photodiode Timing Circuitry
5. Checking Circuitry
6. Interface Circuitry

7. Power Supply
8. Light Source
9. Control Panel

## 1.2 Physical Dimensions

A. Over-All Width	28 $\frac{1}{2}$ "
B. Over-All Height	30"
C. Over-All Depth	25"
D. Approximate Weight	110 lbs.

## 1.3 Functions

The Speedreader 400 consists of a single 1500 card capacity input hopper and one 1,000 card capacity output hopper. Punched cards are picked from the input hopper by an impact and friction mechanism, using a rotating wheel made of either natural rubber or polyurethane. The rotating wheel is driven to impact with the punched card by a solenoid when an electronic pulse (pick command) is received from the unit to which the Speedreader 400 is inputting. Punched cards may be placed in the input hopper concurrent with card reader operation.

## 2.0 TRANSPORT SPECIFICATIONS

1. Card Velocity:	4693.5 Inches Per Minute
2. Asynchronous Rated Speed:	400 Cards Per Minute
3. Time Between Columns:	1112 $\pm$ 100 Microseconds
4. Time Between Cards at Rated Speed:	55.7 Milliseconds
5. Power:	110 Volts, 1 $\emptyset$ , 60 Cycle A.C. 1/2 H.P. Motor A.C.

## 3.0 ELECTRONIC SPECIFICATIONS

### 3.1 General

The electronic hardware is as outlined in Section 1.1 (D).

### 3.2 Performance

#### 3.2.1 Control Times

##### A. Access Time

Access time is defined as the time starting at the receiving of the pick command at the reader, and ending with the sending of the first column of information.

Average Time: 35 Milliseconds

### 3.2.2 Input - Output

#### 3.2.2.1 Output Times

##### A. Data

The data pulses shall be 10 to 40 microseconds.

##### B. Index Timing

1. Mechanical:  $1112 \pm 100$  microseconds between pulses.

2. Acceptable Limits:

A "Timing Pulse" shall not occur sooner than 65 microseconds after the leading edge or later than 65 microseconds before the trailing edge of a  $1000 \pm 100$  microsecond output of any photodiode in its column. The time between leading edges of index timing pulses will be  $1112 \pm 100$  microseconds with non-accumulative error.

##### C. Read Time

The total time required to read 80 columns of one card shall be approximately 86 milliseconds.

#### 3.2.2.2 Input - Output Signal Levels

1. The line drivers shall deliver the following output voltage levels:

High: Negative Level: 2.0 K resistor tied to -15 Volts.

Low:  $\pm 0.0$  Volts to -.55 Volts.

2. The line receivers require the following input voltage levels:

High:  $-6 \pm 3$  Volts at 5 milliamps

Low: +0.0 Volts to -.55 Volts

### 3.2.2.3 Input - Output Lines

#### A. Input Lines:

##### 1. Pick:

This line shall require a negative signal of 10 microseconds minimum pulse width to initiate a card feed. A pulse is required for each card feed.

##### 2. Clear Photodiode Error:

This is a negative signal of 10 microsecond minimum duration, used to clear the photodiode error flip flop in the reader.

#### B. Output Lines:

##### 1. Data:

These twelve (12) lines corresponding to the twelve rows on the card carry the data signals. A negative pulse of approximately 10 microseconds shall be present for each punched hole read.

##### 2. Index Timing:

This is a negative pulse of approximately 10 microseconds and occurs at the same time as a data pulse. An index timing pulse references the time the data pulses area read out. There will be 80 index timing pulses for an 80 column card.

##### 3. Card Presence:

This is a negative signal which is present as long as a card is passing over the read head.

##### 4. Reader Operable:

This is a negative level which shall be dropped upon detection of an inoperable condition. The level shall be dropped immediately upon detection of a non-pick or transport jam condition. For all other inoperable conditions the level will drop immediately when no card presence exists

or immediately after card presence is dropped if card presence exists.

5. Photodiode Error:

When a photodiode check failure occurs this output goes to a negative level. This output shall stay up until the card reader receives a clear photodiode error signal. (Section A.2)

3.2.3 Checking Circuitry

The following checking circuitry will be provided to insure proper operation of the Speedreader 400 and protect certain mechanical parts from damage.

A. 3 No Pick - Throat Jam Check

This circuitry checks the passage of the card from the input hopper through the throat, to the data read station. If the card does not reach the data read station, an inoperable condition will be indicated to the computer and on the control panel of the Speedreader 400 and the transport motor of the reader will be stopped. The time allowed for this check is 90 milliseconds. If the full 90 milliseconds is required to pick, the picker will be in contact with the card for 15 milliseconds, will drop out for 22 milliseconds, and this cycle will be repeated three (3) times. Thus three (3) picks are generated.

B. Transport Check

This circuitry checks the passage of the card from the data read station to the entrance of the output hopper. If the card does not pass through the transport channel in the specified time, an inoperable condition will be indicated to the computer on the control panel of the Speedreader 400 and the transport motor will be stopped.

C. Output Hopper Jam Check

This circuitry checks the passage of the card from the exit of the transport channel into the output hopper. If the card does not pass through this area in the specified time, an inoperable condition will be indicated to the computer on the control panel of the Speedreader 400 and the transport motor will be stopped.

#### **D. Photodiode Check**

This circuitry checks the light and dark response of the data photodiodes. If the response is not within acceptable limits, an error is indicated to the computer and on the control panel of the Speedreader 400. The dark response will be checked 2070 microseconds after the leading edge of the card passes over the read station and the light response will be checked 200 to 500 microseconds after the trailing edge passes over the read station.

#### **E. Timing Photodiode Check**

The timing photodiodes and circuitry are checked via program control in the computer to which the Speedreader 400 is inputting.

### **4.0 MAINTENANCE**

The equipment shall be maintained in accordance with procedures specified by Uptime. Uptime shall provide an operating and maintenance manual with necessary drawings, a recommended tool list and a list of spare parts.

### **5.0 ENVIRONMENTAL OPERATING CONDITIONS**

The Speedreader 400 shall be capable of operating satisfactorily under the following conditions:

#### **1. Line Voltage**

2.4 KW A.C. power required at 115 V  $\pm$  10% -60 Cycle  
Single Phase

#### **2. Cooling**

Ambient room temperature - 65<sup>o</sup>F to 85<sup>o</sup>F.  
Relative Humidity: 20% to 65%.

#### **3. Punched Card Specifications**

Conditions are stated in E.I.A. Task Force Specification TR 27.6.1.

### **6.0 CABINETRY COLOR**

Painted to customer specifications.

GENERAL SPECIFICATIONS

FOR

SPEEDREADER 800 PUNCHED CARD READER

August 19, 1964

UPTIME CORPORATION  
15910 W. Fifth Avenue  
Golden, Colorado

GENERAL SPECIFICATIONS  
FOR  
SPEEDREADER 800

**0.0 PREFACE**

The SPEEDREADER 800 is a medium-speed photo-electric punched card reader, reading punched cards in a column-by-column fashion at a rated speed of 800 cards per minute.

**1.0 GENERAL DESCRIPTION**

**1.1 Equipment**

The SPEEDREADER 800 punched card reader consists of the following components:

**A. Transport**

1. Card Input Hopper
2. Picker Mechanism
3. Transport Channel
4. Card Output Hopper #1
5. Card Reject Bin (approximately 100 cards) and Selection Mechanism - Optional
6. One Drive Motor and Power Train
7. Photo-Electric Reading and Timing Head complete with Photodiodes
8. Hopper Inserts for 51 Column Card Operation - Optional
9. Input and Output Hopper Card Weights

**B. Structural Frame**

This is a rigid welded assembly, fabricated from 1-1/4" X 1-1/4" x 1/8" angle iron. All surfaces are sandblasted, primed and painted. The frame is mounted on four casters, two of which can be locked in place.

**C. Cabinetry**

All metal cabinet painted to customer specifications and trimmed with brushed aluminum. The table top for ruffling cards is white formica. The power supplies, electronics and ventilating system are included within the cabinetry. The top access cover and the front and back doors are removable for easy access.

#### D. Electronic Hardware

1. Picking Circuitry
2. Control Circuitry
3. Photodiode Reading Circuitry
4. Photodiode Timing Circuitry
5. Checking Circuitry
6. Selection Vane Circuitry - Optional
7. Interface Circuitry
8. Power Supply
9. Light Source
10. Control Panel
11. 12 Bit Data Register

#### 1.2 Physical Dimensions

A. Over-All Width	29"
B. Over-All Height	40"
C. Over-All Depth	33"
D. Approximate Weight	325 lbs.

#### 1.3 Functions

The SPEEDREADER 800 consists of a single 2500 card capacity input hopper and one 2000 card capacity output hopper. Punched cards are picked from the input hopper by an impact and friction mechanism, using a rotating wheel made of either natural rubber or polyurethane. The rotating wheel is driven to impact with the punched card by a magnetic coil. This picking action moves the card through a knife throat into the transport by an electronic pulse (pick command) received from the computer to which the SPEEDREADER 800 is inputting. The selection vane (optional equipment) in the transport channel, directs cards into the output hopper or reject bin. The vane is actuated by a magnetic coil receiving a signal from the computer. Punched cards may be placed in the input hopper or removed from the output hopper concurrent with card reader operation.

#### 2.0 TRANSPORT SPECIFICATIONS

1. Card Velocity:	10,800 Inches Per Minute
2. Asynchronous Rated Speed:	800 Cards Per Minute
3. Time Between Columns:	480 $\pm$ 75 Microseconds
4. Time Between Cards at Rated Speed:	20 Milliseconds
5. Selection Vane Decision Time (Based on Reading all 80 Columns of the Card):	25 Milliseconds - Max.
6. Power:	110 Volts, 1 Ø, 60 Cycle A.C. 1/2 H.P. Motor A.C.

### **3.0 ELECTRONIC SPECIFICATIONS**

#### **3.1 General**

The electronic hardware is as outlined in Section 1.1 (D).

#### **3.2 Performance**

##### **3.2.1 Control Times**

###### **A. Access Time**

Access time is defined as the time starting at the receiving of the pick command at the reader, and ending with the sending of the first column of information.

Average Time: 18 Milliseconds

###### **B. Selection Decision Time - Optional**

This is defined as the maximum time available after the sending of column 80 information for actuating the selection vane.

Decision Time: 25.0 Milliseconds

##### **3.2.2 Input - Output**

###### **3.2.2.1 Output Times**

###### **A. Data**

The data pulses shall be 10 to 40 microseconds.

###### **B. Index Timing**

1. Mechanical:  $480 \pm 75$  Microseconds between pulses.

2. Acceptable Limits:

A "Timing Pulse" shall not occur sooner than 65 microseconds after the leading edge or later than 65 microseconds before the trailing edge of a  $385 \pm 85$  microsecond output of any photodiode in its column. The

time between leading edges  
of index timing pulses will  
be  $480 \pm 75$  microseconds  
with non-accumulative error.

### C. Read Time

The total time required to read 80 columns  
of one card shall be approximately 38 milli-  
seconds.

#### 3.2.2.2 Input - Output Signal Levels

1. The line drivers shall deliver the following output voltage levels:

High: Negative Level: 2.0 K resistor tied to -15 Volts.

Low:  $\pm 0.0$  Volts to -.55 Volts.

2. The line receivers require the following input voltage levels:

High:  $-6 \pm 3$  Volts at 5 milliamps

Low: +0.0 Volts to -.55 Volts

#### 3.2.2.3 Input - Output Lines

##### A. Input Lines

###### 1. Pick

This line shall require a negative signal of 10 microseconds minimum pulse width to initiate a card feed. A pulse is required for each card feed.

###### 2. Clear Photodiode Error

This is a negative signal of 10 microsecond minimum duration, used to clear the photodiode error flip flop in the reader.

###### 3. Reject (Optional)

This is a negative signal which causes a card to be directed to the reject stacker.

## B. Output Lines

### 1. Data

These twelve (12) lines corresponding to the twelve rows on the card carry the data signals. A negative pulse of approximately 10 microseconds shall be present for each punched hole read.

### 2. Index Timing

This is a negative pulse of approximately 10 microseconds and occurs at the same time as a data pulse. An index timing pulse references the time the data pulses are read out. There will be 80 index timing pulses for an 80 column card.

### 3. Card Presence

This is a negative signal which is present as long as a card is passing over the read head.

### 4. Reader Operable

This is a negative level which shall be dropped upon detection of an inoperable condition. The level shall be dropped immediately upon detection of a non-pick or transport jam condition. For all other inoperable conditions the level will drop immediately when no card presence exists or immediately after card presence is dropped if card presence exists.

### 5. Photodiode Error

When a photodiode check failure occurs this output goes to a negative level. This output shall stay up until the card reader receives a clear photodiode error signal. (Section A.2)

### 6. Clear Reject (Optional)

This output will be a negative pulse which is used to clear the reject line

from the computer. It shall come up after the end of output hopper selection decision time.

#### 7. 51/80 Column (Optional)

This line shall be negative only when the 51/80 column switch is in the 51 column position and the reader is set to read 51 column cards. At all other times this line shall be at ground.

### **3.2.3 Checking Circuitry**

The following checking circuitry will be provided to insure proper operation of the SPEEDREADER 800 and protect certain mechanical parts from damage.

#### **A. 3 No Pick - Throat Jam Check**

This circuitry checks the passage of the card from the input hopper through the throat, to the data read station. If the card does not reach the data read station, an inoperable condition will be indicated to the computer and on the control panel of the SPEEDREADER 800 and the transport motor of the reader will be stopped. The time allowed for this check is 90 milliseconds. If the full 90 milliseconds is required to pick, the picker will be in contact with the card for 15 milliseconds, will drop out for 22 milliseconds, and this cycle will be repeated three (3) times. Thus three (3) picks are generated.

#### **B. Transport Check**

This circuitry checks the passage of the card from the data read station to the entrance of the output hopper. If the card does not pass through the transport channel in the specified time, an inoperable condition will be indicated to the computer and on the control panel of the SPEEDREADER 800, and the transport motor will be stopped.

#### **C. Output Hopper Jam Check**

This circuitry checks the passage of the card from the exit of the transport channel into the output hopper. If the card does not pass through this area in the specified time, an inoperable condition will be indicated to the computer and on the control panel of the SPEEDREADER 800, and the transport motor will be stopped.

#### **D. Photodiode Check**

This circuitry checks the light and dark response of the data photodiodes. If the response is not within acceptable limits, an error is indicated to the computer and on the control panel of the SPEEDREADER 800. The dark response will be checked 900 microseconds after the leading edge of the card passes over the read station and the light response will be checked 200 microseconds after the trailing edge passes over the read station.

#### **E. Timing Photodiode Check**

The timing photodiodes and circuitry are checked via program control in the computer to which the SPEEDREADER 800 is inputting.

### **4.0 MAINTENANCE**

The equipment shall be maintained in accordance with procedures specified by Uptime. Uptime shall provide an operating and maintenance manual with necessary drawings, a recommended tool list and a list of spare parts.

### **5.0 ENVIRONMENTAL OPERATING CONDITIONS**

The SPEEDREADER 800 shall be capable of operating satisfactorily under the following conditions:

#### **1. Line Voltage**

2.4 KW A.C. power required at 115 V  $\pm$  10% - 60 Cycle Single Phase.

#### **2. Cooling**

Ambient room temperature - 65° F to 85° F.

Relative Humidity: 20% to 65%.

#### **3. Punched Card Specifications**

Conditions are stated in E.I.A. Task Force Specification TR 27.6.1.

### **6.0 CABINETRY COLOR**

Painted to customer specifications.

GENERAL SPECIFICATIONS

FOR

SPEEDREADER 2000 PUNCHED CARD READER

August 18, 1964

UPTIME CORPORATION  
15910 W. 5th Avenue  
Golden, Colorado



FIGURE 1

GENERAL SPECIFICATIONS  
FOR  
SPEEDREADER 2000

**0.0 PREFACE**

The SPEEDREADER 2000 is a high-speed photo-electric punched card reader, reading punched cards in a row-by-row fashion at a rated speed of over 2000 cards per minute.

**1.0 GENERAL DESCRIPTION**

**1.1 Equipment:**

The SPEEDREADER 2000 punched card reader consists of the following components:

**A. Transport**

1. Card Input Hopper.
2. Picker Mechanism.
3. Transport Channel.
4. Card Output Hopper.
5. Drive Motor and Power Train.
6. Photo-Electric Reading and Timing Head, complete with Photodiodes.
7. Control Panel.
8. Light Source.
9. Ventilation Fan.
10. Input and Output Card Weights.

**B. Structural Frame**

This is a lightweight rigid assembly, fabricated from 1/2" x 1-1/8" bar aluminum and aluminum honeycomb material. All surfaces are finished and clear anodized. Legs are adjustable for proper leveling.

**C. Cabinetry**

The cabinet is all metal - painted to customer specifications and trimmed with decorative aluminum. The power supplies, electronics and ventilating system are included within the cabinet. The side panels are removable for easy access.

**D. Electronic Hardware**

1. Picking Circuitry.

2. Photodiode Amplifying Circuitry.  
3. Checking Circuitry.

- a. Skew Check.
- b. Photodiode Check.
- c. Stacker Jam Check.
- d. Non-Pick.

4. Control Circuitry.

- a. Hopper Full/Stacker Empty.
- b. Timing.
- c. Error.

5. 80 Bit Data Register (optional).  
6. Power Supply.

1.2 Physical Dimensions:

A. Over-All Height:	45 Inches
B. Over-All Length:	67-5/8 Inches
C. Over-All Width:	26-1/2 Inches
D. Approximate Weight:	250 Lbs.

1.3 Function:

The SPEEDREADER 2000 consists of a single 4000 card capacity input hopper and a 3000 card capacity output hopper.

Punched cards are picked from the input hopper by an impact and friction mechanism, using a rotating wheel made of either natural rubber or polyurethane. The rotating wheel is driven both to and from impact with the punched card by a magnetic coil. This coil is actuated by an electric pulse (pick command) received from the computer to which the SPEEDREADER 2000 is inputting.

The picking action moves the card approximately .33" through the knife throat to be caught between a set of steel against polyurethane interference rollers. The card is moved past the data and timing photodiodes in the read head to a second set of rollers and then to a third set. The third set of rollers stack the cards in the output hopper.

Punched cards may be placed in the input hopper or removed from the output hopper concurrent with card reader operation.

Original card deck orientation is maintained in the output hopper.

1.4 Description of Figure 2:

1. Input Hopper: 4000 card capacity.

2. Input Card Weight: Weight to assure proper card alignment during input function.
3. Motor Switch: Control switch to drive motor.
4. Read Head: Houses reading and timing photodiodes.
5. Roller: Guides and drives punched cards along transport channel.
6. Output Card Weight: Weight to assure proper card alignment during stacking operation.
7. Output Hopper: 3000 card capacity.
8. Hopper Full Switch: Senses condition of output hopper.

## **2.0 TRANSPORT SPECIFICATIONS**

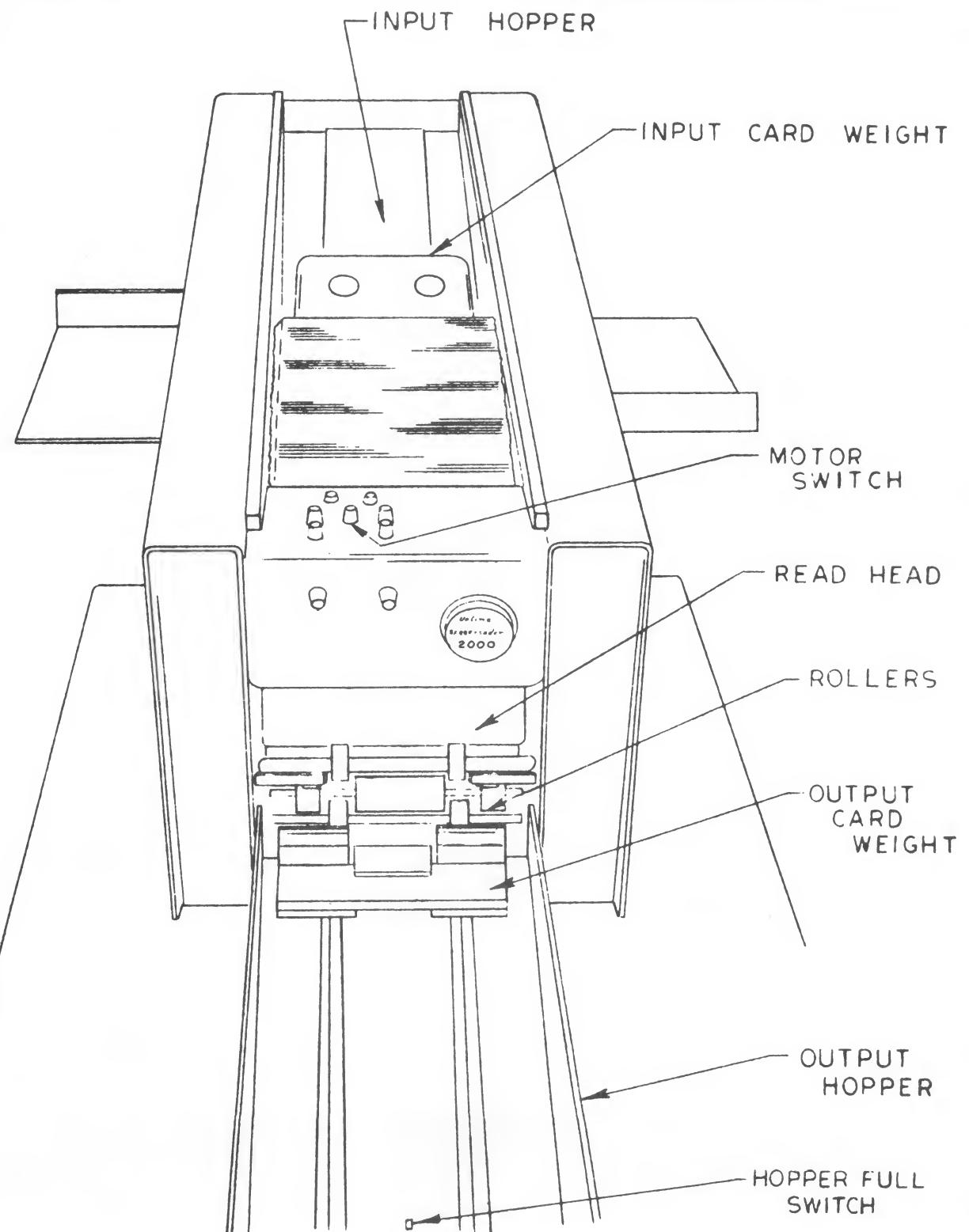
1. Asynchronous Rated Speed:	Over 2000 Cards Per Minute.
2. Transport Velocity:	.270 Inches Per Millisecond.
3. Load Hopper Capacity:	4000 Cards.
4. Stacker Hopper Capacity:	3000 Cards.
5. Drive Motor:	1/4 H.P., 115 V, 60 Cycle A.C.
6. Light Source:	One (1) 250 Watt Infrared Lamp.
7. Time between pick command and first row on the read head.	Access Time: 10 Milliseconds.
8. Pitch Time:	926 Microseconds.
a. Information Time:	463 Microseconds.
b. Time Between Rows:	463 Microseconds.
9. Time Between Cards:	16.5 Milliseconds.

The above specifications are based on a card rate of 2100 cards per minute and a transport speed of .270 inches per millisecond. Should a different timing specification be required, such as a longer information time, this can be accomplished by lowering the transport velocity. Generally speaking, a change of this nature would not affect the price.

## **3.0 ELECTRONIC SPECIFICATIONS**

### **A. Input - Output Signal Levels**

1. The line drivers shall deliver the following output



SPEEDREADER — READY TO OPERATE

FIGURE 2

voltage levels:

High: Negative Level: 2.0 K resistor tied to -15 Volts.

Low: + 0.0 Volts to -.55 Volts.

2. The line receivers require the following input voltage levels:

High: -6 +3 Volts at 5 milliamps

Low: +0.0 Volts to -.55 Volts.

B. Control Lines

1. Reader Operable Line

This line goes to negative voltage for no error condition. For any error condition it goes to ground and stays in this condition until error is cleared.

2. Row 9 Pulse

This line emits a negative pulse (same pulse width as data) when row 9 is over the read head.

3. End of Card Pulse

This line emits a negative pulse (same pulse width as data) approximately 200 microseconds after the trailing edge of the card passes over the read head. This line also goes to a negative level when a non-pick error is detected to keep the processor from cycling.

4. Interrupt

This line emits a negative pulse which starts when the leading edge of the card passes over the throat diode and ends when the leading edge of the card passes over the data read line. This line is used to inform the processor that a card has been fed and information is coming.

5. Pick

a. This line shall require a negative signal of 10 microseconds minimum pulse width to initiate a card feed. A pulse is required for each card feed.

b. A connector shall be wired so that insertion of an

M-2 type multivibrator circuit card will provide automatic picking of cards for maintenance purposes. Rate of card picking shall be approximately two (2) cards per second. Purchase of the M-2 card shall be optional.

C. Data Lines and Timing Control Line

These 81 lines (80 data and 1 timing) emit negative pulses; pulse width can be varied.

4.0 MAINTENANCE

The equipment shall be maintained in accordance with procedures specified by Uptime. Uptime shall provide an operating and maintenance manual with necessary drawings, a recommended tool list, and a list of spare parts.

5.0 ENVIRONMENTAL OPERATING CONDITIONS

The SPEEDREADER 2000 shall be capable of operating satisfactorily under the following conditions:

A. Line Power Requirements

1. For Drive Motor, Light Source and Fan:

a. 117 Volts, A.C. Single Phase, 60 Cycle  
at 8 AMPS  $\pm$  10%.

2. For Logic Power Supply:

a. 117 Volts, A.C. Single Phase, 60 Cycle  
at 8 AMPS  $\pm$  5%.

B. Cooling

1. Ambient Room Temperature: 65° F to 85° F.
2. Relative Humidity: 20% to 65%.

C. Punched Card Specifications

Conditions as stated in E.I.A. Task Force Specification TR 27.6.1.

**GENERAL SPECIFICATIONS**

**FOR**

**SPEEDREADER 1500 PUNCHED CARD READER**

**January 12, 1965**

**UPTIME CORPORATION  
15910 W. 5th Avenue  
Golden, Colorado**

**279-3351**

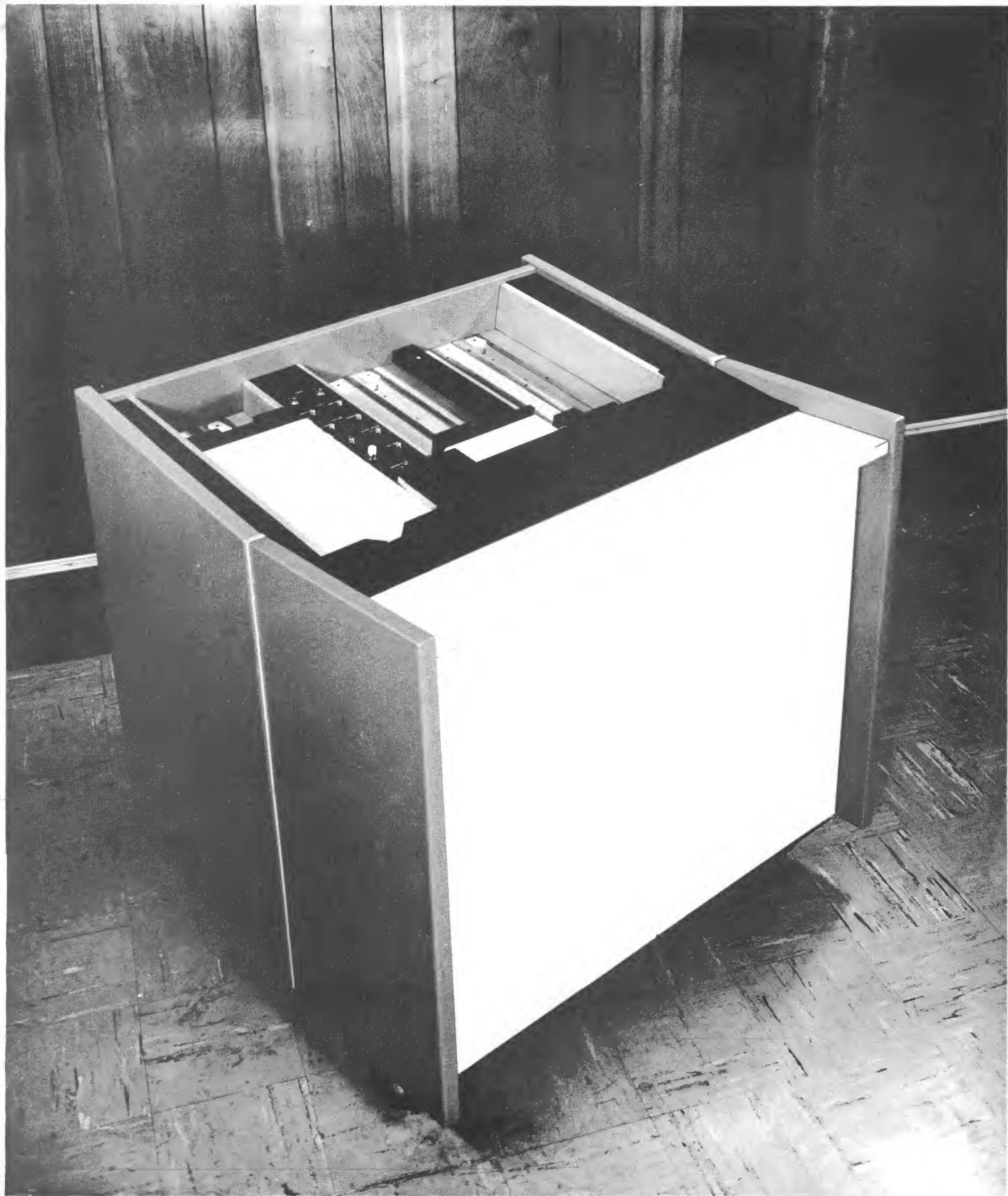


FIGURE 1

GENERAL SPECIFICATIONS  
FOR  
SPEEDREADER 1500

**0.0 PREFACE**

The SPEEDREADER 1500 is a high-speed photo-electric punched card reader, reading punched cards in a column-by-column fashion at a rated speed of 1500 cards per minute.

**1.0 GENERAL DESCRIPTION**

**1.1 Equipment:**

The SPEEDREADER 1500 punched card reader consists of the following components:

**A. Transport**

1. Card Input Hopper.
2. Picker Mechanism.
3. Transport Channel.
4. Card Output Hopper #1.
- \*5. Card Output Hopper #2.
- \*6. Selection Vane Mechanism.
7. Two Drive Motors and Power Train.
8. Photo-Electric Reading and Timing Head complete with Photodiodes.
9. Mirror to reflect light source.
- \*10. Hopper Inserts for 51 Column Card operation with associated Input and Output Hopper Card Weights.
11. Input and Output Hopper Card Weights for 80 Column Card operation.

**B. Structural Frame**

This is a rigid welded assembly, fabricated from  $1\frac{1}{4}$ " X  $1\frac{1}{4}$ " X  $\frac{1}{8}$ " angle iron. All surfaces are sandblasted, primed and painted. Also included are four (4) castors (two lock type).

**C. Cabinetry**

The cabinet is all metal - painted to customer specifications and trimmed with brushed aluminum. The table top for ruffling cards is white formica. The power supplies, electronics and

\* Optional Feature

ventilating system are included within the cabinetry. The top access cover and the front and back doors are removable for easy access.

D. Electronic Hardware

1. Picking Circuitry.
2. Control Circuitry.
3. Photodiode Reading Circuitry.
4. Photodiode Timing Circuitry.
5. Checking Circuitry.
6. Selection Vane Circuitry - optional.
7. Interface Circuitry.
8. Power Supply.
9. Light Source.
10. Control Panel.
11. 12 Bit Data Register.

1.2 Physical Dimensions:

A. Over-All Width:	38.5 Inches
B. Over-All Height:	40.0 Inches
C. Over-All Depth:	With Doors Open - 56.37 Inches With Doors Closed - 32.37 Inches
D. Approximate Weight:	400 lbs.

1.3 Functions:

The SPEEDREADER 1500 consists of a single, 2500 card capacity, input hopper and one, 2000 card capacity, output hopper. A second 2000 card capacity output hopper can be added as an optional feature for one card sort or reject capability. Punched cards are picked from the input hopper by an impact and friction mechanism, using a rotating wheel made of either natural rubber or polyurethane. The rotating wheel is driven both to and from impact with the punched card by a magnetic coil. This coil is actuated by an electronic pulse (pick command) received from the computer to which the SPEEDREADER 1500 is inputting.

The picking action moves the card approximately .33 inches through a knife throat, into the transport channel consisting of five (5) sets of metal rollers driving against polyurethane idlers. The selection vane (optional) in the transport channel direct cards into one of the two output hoppers. Similar to the picker, the vane is actuated by a magnetic coil, receiving a signal from the computer. Operation of this selection vane which determines the output hopper into which the last card picked is placed is under program control. Vane control circuitry is included in the SPEEDREADER 1500 to insure against premature activation of the selection vane. This control delays the reject vane response until the proper time, allowing the preceding card to completely clear the selection vane area. Punched cards may be placed in the input hopper or removed from either output hopper concurrent with card reader operation.

The following descriptions are referenced to Figure 2:

- A. A 2500 punched card capacity hopper, into which cards that are to be read are loaded face and nine edge down.
- B.C. 2000 punched card capacity output hoppers.
- D. The picker, actuated on command by magnetic coil. Upon impact with card, drives it into the transport channel.
- E. Punched card gate (knife throat): Permits only a single card to pass from the hopper into the transport channel. This gate is adjustable to accommodate various card thicknesses.
  - 1. Hopper empty switch: Senses the condition of the input hopper.
  - 2.3. Output hopper full switches: Sense the condition of the output hoppers.
  - 4.5. Card jam detection photo sensors.
  - 6.7. Light source for 4.,5.
- F. The photo-electric punched card reading and timing head.
- G. Light source for reading and timing head, F.
- H.J. Output hopper pillows: Cushions the card impact.
- K. Selection vane: This apparatus will either deflect a card into hopper B or permit it to continue to hopper C. This selection is made under computer program control.

## 2.0 TRANSPORT SPECIFICATIONS

- 1. Card Velocity: 16,192 Inches Per Minute.
- 2. Asynchronous Rated Speed: 1500 Cards Per Minute (80 column cards)  
2000 Cards Per Minute (51 column cards)
- 3. Time Between Columns:  $322 \pm 50$  microseconds.
- 4. Time Between Cards at Rated Speed: 12.67 milliseconds.
- 5. Selection Vane Decision Time (Based on Reading all 80 Columns of the Card): 6.0 milliseconds, maximum.

6. Power:

110 Volts, 1 Ø, 60 Cycle A.C.; 1/4 and 1/2 H.P. Motors A.C. Two lines, one for logic and light source, one for motors.

3.0 ELECTRONIC SPECIFICATIONS

3.1 General:

The electronic hardware is as outlined in Section 1.1 (D).

3.2 Performance:

3.2.1 Control Times

A. Access Time

Access time is defined as the time starting at the receiving of the pick command at the reader and ending with the sending of the first column of information.

Average Time: 12.5 Milliseconds.

B. Selection Decision Time

This is defined as the maximum time available after the sending of column 80 information for actuating the selection vane.

Decision Time: 6.0 Milliseconds.

3.2.2 Output Times

A. Data

The data pulses shall not be less than 10 microseconds and not greater than 40 microseconds.

B. Index Timing

1. Mechanical:  $322 \pm 50$  Microseconds between the leading edges of successive timing pulses.

C. Read Time

The total time required to read 80 columns of one card shall be approximately 25.5 milliseconds

D. Input - Output Signals

1. The line drivers shall deliver the following output

voltage levels:

High: Negative Level: 2,000 ohm resistor tied to -15.0 volts.

Low: 0.0 volts to -.55 volts.

2. The line receivers require the following input voltage levels:

High:  $-6.0 \pm 3.0$  volts.

Low: +0.0 volts to -.55 volts at 3 milliamps.

#### E. Interface Signals Between Reader and Processor

Input Lines to the Reader from the Processor:

1. Pick:

This line shall require a low signal of 10 microseconds minimum pulse width to initiate a card feed. A pulse is required for each card feed.

2. Clear Photodiode Error:

This is a low signal of 10 microsecond minimum duration, used to clear the photodiode error or misregistration check flip flop in the reader.

3. Reject:

This is a low signal which causes a card to be directed to the reject stacker. The card reader will sample the status of this line 7 ms after the end of card presence. If the decision has been made to reject a card, this line must be low for 10 us or longer at this time.

Output Lines to the Processor from the Reader:

1. Data:

These twelve (12) lines corresponding to the twelve rows on the card, carry the data signals. A high pulse of approximately 10 microseconds shall be present for each punched hole read.

2. Index Timing:

This is a high pulse of approximately 10 microseconds and occurs at the same time as a data pulse. An

index timing pulse references the time the data pulses are read out. There will be 80 index timing pulses for an 80 column card.

3. Card Presence:

This is a high signal which is present as long as a card is passing over the read head.

4. Reader Operable:

This is a high level which shall be dropped upon detection of an inoperable condition. The level shall be dropped immediately upon detection of a non-pick or transport jam condition. For all other inoperable conditions the level will drop immediately if no card presence exists or immediately after card presence is dropped if card presence exists.

5. Photodiode Error:

When a photodiode check failure or misregistration check failure occurs this output goes to a high level. This output shall stay high until the card reader receives a clear photodiode error signal from the processor.

6. Clear Reject (optional).

7. 51/80 Column (optional).

This line shall be high only when the 51/80 column switch is in the 51 column position and the reader is set to read 51 column cards. At all other times this line shall be at ground.

### 3.2.3 Checking Circuitry

The following checking circuitry will be provided to insure proper operation of the SPEEDREADER 1500 and protect certain mechanical parts from damage.

#### A. 3 No Pick - Throat Jam Check

This circuitry checks the passage of the card from the input hopper through the throat to the data read station. If the card does not reach the data read station, an error will be indicated to the computer and on the control panel of the SPEEDREADER 1500, and the motors of the reader will be stopped. The time allowed for this

check is 90 milliseconds. If the full 90 milliseconds is required to pick, the picker will be in contact with the card for 16 milliseconds, will drop out for 16 milliseconds, and this cycle will be repeated three (3) times. Thus three (3) picks are generated.

B. Transport Check

This circuitry checks the passage of the card from the data read station to the entrance of the output hopper. If the card does not pass through the transport channel in the specified time, an error will be indicated to the computer and on the control panel of the SPEEDREADER 1500, and the motors of the reader will be stopped.

The allowable time will be 90 milliseconds  $\pm$  20%, for the passage into output hopper #1, and 130 milliseconds  $\pm$  20% into output hopper #2.

C. Output Hopper Jam Check

This circuitry checks the passage of the card from the exit of the transport channel into the output hopper. If the card does not pass through this area in the specified time, an error will be indicated to the computer, and on the control panel of the SPEEDREADER 1500, and the motors of the reader will be stopped.

The time allowed for passage of the card into output hopper #1 is 35 milliseconds and hopper #2 is 41 milliseconds.

D. Photodiode Check

This circuitry checks the light and dark response of the data photodiodes. If the response is not within acceptable limits, an error is indicated on the computer and control panel of the SPEEDREADER 1500.

The dark response will be checked 600 microseconds after the leading edge of the card passes over the read station, and the light response will be checked 150 microseconds after the trailing edge passes over the read station.

E. Timing Photodiode Check

The timing photodiodes and circuitry are checked via program control in the computer to which the SPEEDREADER 1500 is inputting. The computer must count the pulses to assure that the proper numbers have been received per card (e.g. 80 pulses for an 80 column card).

F. Misregistration Check

The misregistration check checks for misregistered cards

by checking the time relationship between the timing and data pulses. If an error is detected, it will be indicated on the indicator panel and a photodiode error signal will be sent to the processor.

#### **4.0 MAINTENANCE**

The equipment shall be maintained in accordance with procedures specified by Uptime. Uptime shall provide an operating and maintenance manual with necessary drawings, a recommended tool list, and a list of spare parts.

#### **5.0 ENVIRONMENTAL OPERATING CONDITIONS**

The SPEEDREADER 1500 shall be capable of operating satisfactorily under the following conditions:

1. Line Voltage:                           3.5 KVA A.C. power required at 115 V  
   ± 10%; 60 cycles single phase.
2. Cooling:                                 Ambient Room Temperature: 65°F to  
   85°F.  
   Relative Humidity: 20% to 65%.
3. Punched Card Specifications: Conditions as stated in E.I.A. Task Force Specification TR 27.6.1.

FIGURE 2

